

information on the subject. In the islands of St. Christopher and Nevis, which form part of the division of islands commonly called the Lesser Antilles, monkeys are found in large numbers, and a planter friend in the former island, which I have recently visited, assured me that he had lately been obliged to appoint a "monkey-watchman" to protect the cane-fields and the sweet-potato fields of his estate from the destructive raids of bands of monkeys.

In the island of Nevis, which at one time must have formed part of St. Christopher, and which is now only divided from the latter by a very narrow arm of the sea, appropriately called "The Narrows," monkeys—the same as those of St. Christopher—exist in great numbers, and I may add that the tails are "perfectly prehensile," *i.e.*, "naked beneath towards the tip."

Of Trinidad I cannot speak from personal observation, but a scientific friend of mine, Dr. H. A. Alford Nicholls, who lately visited Trinidad, kindly writes to me as follows:—"Prof. Mivart has certainly made a mistake about there being no monkeys in the West Indies. I find, too, that in a work on 'Central America, the West Indies, and South America,' edited by the traveller, Bates, it is stated that there are no monkeys in the Antilles. You know more of the monkeys of St. Kitts and Nevis than I do, but I can tell you something of your Trinidad cousins. There are two kinds of monkeys in Trinidad, and as the fauna is continental, they will doubtless be found on the mainland of South America. One belongs to the *Mycetes*, and it is called the Red Howler, partly on account of its loud and hideous cries; the other, a diminutive specimen of the *Cebidæ*, is called the 'Sapajou'; it is a *Cebus*."

I shall be glad to supply any further information on the subject of monkeys in St. Christopher and Nevis.

Dominica, British West India,
November 11

EDMUND WATT

Earthquakes in Iceland

IN NATURE, vol. xxi. p. 89, I see the earthquake which occurred in Iceland on September 24 last ascribed to "volcanic eruptions in the Krisuvik Mountains, a locality where eruptions have not been known within the memory of the present generation." The use of the word "eruption" here is misleading, for though the earthquakes, which frequently occur at Krisuvik, are no doubt caused by volcanic action, nothing of the nature of an *eruption*, in the usual sense of the word, has been known to occur there within the historical period. The boiling springs, mud caldrons, and sulphur deposits, for which Krisuvik is noted, are, on the authority of Prof. Bunsen (Letters to Berzelius), to be ascribed to a pseudo-volcanic action occurring at comparatively slight depths. Though slight earthquake shocks have frequently occurred, during the last eighteen months, while I was at Krisuvik, I have never observed that they had any effect on the boiling springs and other thermal phenomena.

The earthquake of September 24 last, though more violent than any other which I have experienced there, differed from the rest in no other respect. They are generally confined to the neighbourhood of the hot springs and sulphur beds, though the last was felt over a wider area, and seldom do any damage.

Edinburgh, December 1

W. G. SPENCE PATERSON

Diatoms in London Clay

I DO not know if diatoms have been observed in the London clay, or not. If they have not, it may interest many to know that I have discovered triangular, quadrangular, elliptical, and discoidal forms in the London clay of Sheppey. The frustules are frequently perfect, and the markings are plainly discernible as square-sided depressions or elevations; I am not certain which. One of the discoidal forms is an old friend, for I observed it in abundance two years ago; but as I then had no knowledge of diatoms, I passed large quantities by as pyritous concretions.

In my ignorance I stated in a paper on the well referred to (*Proc. Geol. Assoc.*, vol. v. p. 357): "It should be mentioned that at and below 293 feet the clay was thickly studded with very minute disks of iron pyrites, each having a boss in the centre, and the edge slightly turned up all round. They were uniformly perfect, as much so as if cast in one mould."

A few days ago I saw *Anlicodiscus oregonus*, and was struck by its resemblance to the disks I had seen in the London clay. As I had not preserved any of these, I set to work to get more,

if possible, and last night I was fortunate enough to find several distinct species.

W. H. SHRUBSOLE

62, High Street, Sheerness-on-Sea, December 2

Colour-Blindness

THE remarks of Mr. Everett at the close of his paper (NATURE, vol. xxi. p. 62) on Prof. Hering's theory, seem to be founded on a misconception. Prof. Hering assumes, not four, but six elements of colour-sensations connected by the equations—

$$B + W = 0 R + C = 0 B' + Y = 0.$$

The specification of any colour in his system contains three independent variables, and is of the form

$$D = a W + B' R + c b,$$

and it will usually take four equations to eliminate WR and B .

It must be noted that Prof. Hering assumes that the red-green and blue-yellow sensations never occur in nature pure, but always mixed with white. If this is granted I do not think that the result of Maxwell's experiments on colour-mixture will be found inconsistent with his theory.

JOHN TENNANT

19, The Boltons, S.W., November 28

Intellect in Brutes

I OFFER the following illustrations of reasoning powers in animals, should you care to insert them.

1. Some years since, while hunting in Northern Michigan, I tried, with the aid of a professional trapper, to entrap a fox who made nightly visits to a spot where the entrails of a deer had been thrown.

Although we tried every expedient that suggested itself to us, we were unsuccessful, and, what seemed very singular, we always found the empty trap sprung.

My companion insisted that the animal dug beneath it, and putting his paw beneath the jaw, pushed down the pan with safety to himself; but though the appearances seemed to confirm it, I could hardly credit his explanation. This year in another locality of the same region, an old and experienced trapper assured me of its correctness, and said in confirmation, that he had several times caught them, after they had made two or three successful attempts to spring the trap, by the simple expedient of setting it upside down, when, of course, the act of undermining and touching the pan would bring the paw within the grasp of the jaws.

2. A Dandie Dinmont terrier, after the death of his mistress, was playing with some children in a room into which was brought a photograph (large) of her, that he had never previously seen. It was placed upon the floor leaning against the wall. In the words of my informant, who witnessed it, the dog, when he suddenly caught sight of the picture, "crouched and trembled all over, his whole body quivering. Then he crept along the floor till he reached it, and, seating himself before it, began to bark loudly, as if he would say, 'Why don't you speak to me?'" The picture was moved to other parts of the room, and he followed, seating himself before it and repeating his barking.

3. The dog whose demoralisation by the salute of a monkey was published in NATURE, vol. xviii. p. 77, recently had another encounter with one, and behaved in so sneaking a manner as showed that he had not forgotten his first impression.

Boston, November 22

C. F. CREHORE

Electric Lighting

IN NATURE, vol. xx. p. 641, you say, "For the first time perhaps in the history of electric lighting two rival magneto electric machines are illuminating the same hall." I can state an earlier instance, though not an exact parallel. At the annual fair of the American Institute, held in New York during September, October, and November, 1878, the main hall was illuminated by the Wallace-Farmer machine and light, and the machinery hall—directly communicating with it, by the Brush apparatus. The two halls form practically one.

ALEX. S. GIBSON

Norwalk, Conn., U.S.A., November 14

JEAN BAPTISTE ALPHONSE CHEVALLIER

THE death is recorded on December 1 of Prof. A. Chevallier, who deserves notice here as one of the Nestors of French pharmaceutical chemistry. He was

born at Langues, in Lorraine, July 19, 1793. After completing a course of scientific study, he opened a pharmacy in Paris, where he soon attracted attention by his talent for investigation, as well as by his ability in scientific literary work. In 1825 he assumed the editorship of the *Journal de Chimie médicale*, and continued this labour until some years prior to his death, having as associates Payen, Pelouze, Robinet, Orfila, Pélégot, Dumas, and other leading chemists of the day. Soon after entering upon his career as investigator, his merits were recognised by the government, and he gave up his business connections to accept the Chair of Chemistry at the *École supérieure de Pharmacie*, a position which he occupied up to the time of his death.

Among Chevallier's earlier researches should be mentioned his investigations on the absorptive capacities of living plants for various inorganic solutions, and especially his exhaustive studies in connection with Payne, on the hop and the potato, which attracted general attraction. In physiological chemistry notice should be taken of his detection of various poisonous metals, such as lead and copper, in normal organisms. The knowledge of French mineral waters is also greatly indebted to his numerous and exhaustive analyses, and the presence of arsenic in many springs was first signalled by him. The greater portion of Chevallier's life was devoted to the chemical phases of public hygiene, and in this connection he published a number of valuable papers on the detection and prevention of adulteration in a large variety of articles of food, methods of preserving food, disinfectants, &c. Of his devotion to the cause of scientific inquiry an interesting anecdote is related from the earlier part of his career. A case of poisoning was to be tried at Paris in which acetate of morphine had been used, and Chevallier, who had sold the salt to the murderer, was summoned as a witness. Anxious to have the full nature of this hitherto untried poison well established, and being limited as to time, he immediately undertook a thorough investigation of its toxic effects on his own system, and succeeded so well that at the trial he was able to give a detailed description of the symptoms attending the use of the drug in question.

As a scientific writer Chevallier was widely and deservedly known. His first work in 1824, in connection with Payen, "*Traité des réactifs chimiques*," reached a third edition in five years. In 1826-29 he published, with Richard and Guillemin, an extensive "*Dictionnaire des Drogues simples et composées*," in five volumes. In 1850 appeared his admirable "*Dictionnaire des Altérations et Falsifications des Substances alimentaires, médicaments, et commerciales*," which reached a third edition in 1858, and was translated into other languages. Other important works were "*Recherches sur les Moyens appliqués à la Conservation des Substances alimentaires*" (1858), "*Du Café, son Histoire, son Usage, etc.*" (1862); "*Traité des Désinfectants sous le Rapport de l'Hygiène publique*" (1862).

T. H. N.

THE SEWAGE OF LONDON

GENERAL SCOTT, in his recent paper at the Society of Arts, entitled "*Suggestions for Dealing with the Sewage of London*," deserves credit for having drawn attention to a subject which in itself must have especial interest for all residents in the metropolis, but which, from the manner in which he has dealt with it, possesses further attractions for those who have made the scientific aspects of the sewage question their study, in that he has really attacked this much-debated problem in an entirely new direction, and has in so far entered upon fresh ground. We do not remember that any previous investigator has set himself the task of examining into the com-

position and character of the suspended matters of water carried sewage coupled with the possibility of the mechanical separation by simple subsidence (1) of the heavier mineral particles or the detritus, and (2) of the lighter flocculent particles, which latter, consisting as they do mainly of the fecal matters, possess a far higher manurial value than the heavier substances washed from the roads and pavements.

The sludge deposited from sewage by one or the other systems of precipitation has received hitherto the chief share of attention from scientific men, and even when the possibility of recovering the solid matters in sewage by some system of straining or rude filtration, or the retention of such solids in tanks, in which the sewage is brought to temporary quiescence, has been considered, it seems on all occasions to have been the practice to regard the entire bulk of such deposits as an inseparable compound of very low value from the manure point of view. It is of course the manurial value of the ingredients contained in suspension and in solution in sewage which has been so frequently inquired into by chemists; and, beginning with the report of Dr. Hoffman and Mr. Witt in 1857, down to that of Messrs. Rawlinson and Read in 1876, a vast mass of valuable information concerning the nature, composition, and value of the manurial elements of town sewage has been accumulated. It has remained for General Scott to point out that—

1. A very large proportion of the solid suspended matters may be removed from sewage by simple subsidence.
2. That such matters may roughly be separated, the more valuable from the valueless, by the method in which such subsidence is accomplished.
3. That after such preliminary treatment, any chemical process for the clarification and partial precipitation of the dissolved impurities of sewage may be carried out far more readily, and under conditions rendering their success in an economical point of view one of greatly increased probability.
4. General Scott has indicated various simple methods for dealing with the silt and detritus removed from the sewage at a relatively small expense; of deodorising and fitting the sludge obtained by subsidence for the manufacture of a manure; and lastly, a mode of further purifying the London sewage by a system of chemical treatment whereby it may be rendered suitable for discharge into a river of large volume.

Assuming the dissolved impurities to be incapable of recovery unless the sewage water can be utilised for irrigation, the first object of General Scott's paper was to show how large an amount of harm was done to rivers and the dwellers on their banks solely by the solid matters contained in sewage. By means of extracts from the reports of the various Royal Commissions who have examined into this question, and the information furnished to the Metropolitan Board of Works by their own advisers, Messrs. Bidder, Hawksley, and Bazalgette, he proved that the deposits in the river, the mud banks, the foul emanations from which were most unhealthy, and the dangers to navigation were all due to the discharge of the solid ingredients of raw sewage into rivers and into the Thames.

General Scott next entered very minutely into the composition of the suspended matters of sewage. An estimate of the total weight of solid matters due to a mixed population of 3,500,000 persons, with a proportionate allowance for the fertilisers existing in the excreta of animals, together with the *débris* of the animal and vegetable substances which might find their way into the sewers, would manifestly represent the sum total of the organic matters in London sewage.

Concerning the gross annual amount of organic matters different estimates appear to vary very slightly, and in assuming them in the case of London at 50,000 tons per